

WHAT IS CLAIMED IS:

1. A fuel cell power plant system for a moving body, comprising:
 - a drive device which drives the moving body by receiving power,
 - a power plant having a fuel cell supplying power to the drive device
 - and a fuel supply device which supplies fuel required for the fuel cell to generate power to the fuel cell, and
 - a controller functioning to:
 - when the moving body has stopped, select one operating mode from plural operating modes according to the running state of the power plant, the fuel cell not generating power to be supplied to the drive device in the plural operating modes, and
 - control the power plant based on the selected operating mode.
2. The system as defined in Claim 1, wherein:
 - the plural operating modes comprise a complete stop mode which completely stops power generation by the power plant.
3. The system as defined in Claim 1, wherein:
 - the plural operating modes comprise a heat generation/dissipation balance mode which causes the power plant to generate power so as to maintain the temperature which can maintain the active state of the power plant.
4. The system as defined in Claim 1, wherein:
 - the plural operating modes comprise a power

generation/consumption balance mode which causes the power plant to generate power according to the power consumption of electronic parts including the controller.

5. The system as defined in Claim 1, further comprising:

a detection device which detects the temperature of the power plant, wherein

the controller further functions to select one operating mode from the plural operating modes based on the temperature of the power plant.

6. The system as defined in Claim 5, wherein:

the detection device detects the temperature of the fuel supply device as the temperature of the power plant.

7. The system as defined in Claim 5, wherein:

the controller further functions to, when the temperature of the power plant is higher than a predetermined temperature threshold, select a complete stop mode which completely stops power generation by the power plant, as the operating mode of the power plant.

8. The system as defined in Claim 5, wherein:

the controller further functions to, when the temperature of the power plant is less than a predetermined temperature threshold, select a heat generation/dissipation balance mode which causes the power plant to generate power so as to maintain the temperature at which the power plant can maintain an active state, as the operating mode of the power plant.

9. The system as defined in Claim 1, wherein:

the controller further functions to:
count the running time and stopping time of the power plant, and
select one operating mode from the plural operating modes based on
the running time before the power plant enters a standby state, and the
stopping time after the power plant enters the standby state.

10. The system as defined in Claim 9, wherein:

the controller further functions to:
tend to select the complete stop mode which completely stops power
generation by the power plant as the operating mode of the power plant,
the longer is the running time before the power plant enters the standby
state, and the shorter is the time after the power plant enters the standby
state.

11. The system as defined in Claim 9, wherein:

the controller further functions to:
tend to select the heat generation/dissipation balance mode which
causes the power plant to generate power so as to maintain the
temperature at which the power plant can maintain an active state, as the
operating mode of the power plant, the shorter is the running time before
the power plant enters the standby state, and the longer is the time after
the power plant enters the standby state.

12. The system as defined in Claim 1, further comprising:

a battery which is charged by the power generated by the fuel cell, and supplies power to the drive device, and

a detection device which detects the charge state of the battery, wherein

the controller further functions to:

select one operating mode from the plural operating modes based on the charge state of the battery.

13. The system as defined in Claim 12, wherein:

the controller further functions to:

select a power generation/consumption balance mode which causes the power plant to generate power according to the power consumption of electronic parts including the controller as the operating mode of the power plant, when the charge state of the battery is less than a predetermined charge state threshold.

14. The system as defined in Claim 5, comprising:

a battery which is charged by the power generation of the fuel cell and supplies power to the drive device, and

a detection device which detects the charge state of the battery, wherein

the controller further functions to:

select one operating mode from the plural operating modes based on the charge state of the battery and the temperature of the power plant.

15. The system as defined in Claim 14, wherein:

the controller further functions to:

select the power generation/consumption balance mode which causes the power plant to generate power according to the power consumption of electronic parts including the controller as the operating mode of the power plant regardless of the temperature of the power plant, when the charge state of the battery is less than a predetermined charge state threshold,

select the heat generation/dissipation balance mode so that a temperature is maintained at which the power plant can maintain an active state as the operating mode of the power plant, when the charge state of the battery is more than the predetermined charge state threshold, and the temperature of the power plant is less than a predetermined temperature threshold, and

select the complete stop mode which causes the power plant to completely stop generating power as the operating mode of the power plant, when the charge state of the battery is more than the predetermined charge state threshold, and the temperature of the power plant is higher than the predetermined temperature threshold.

16. The system as defined in Claim 1, further comprising:

a battery which is charged by the power generation of the fuel cell and supplies power to the drive device, and

a detection device which detects the charge state of the battery, wherein

the controller further functions to:

count the running time and stopping time of the power plant, and

select one operating mode from the plural operating modes based on

the charge state of the battery, the running time before the power plant enters a standby state and the stopping time after the power plant enters the standby state.

17. The system as defined in Claim 16, wherein:

the controller further functions to:

select the power generation/consumption balance mode which causes the power plant to generate power according to the power consumption of electronic parts including the controller as the operating mode of the power plant regardless of the running time before the power plant enters the standby state, when the charge state of the battery is less than a predetermined charge state threshold, and

when the charge state of the battery is more than the predetermined charge state threshold,

tend to select the complete stop mode which causes the power plant to completely stop generating power as the operating mode of the power plant, the longer is the running time before the power plant enters the standby state, or the shorter is the stopping time after the power plant enters the standby state, and

tend to select the heat generation/dissipation balance mode so that a temperature is maintained at which the power plant can maintain an active state as the operating mode of the power plant, the shorter is the running time before the power plant enters the standby state, or the longer is the stopping time after the power plant enters the standby state.

18. The system as defined in Claim 1, wherein:

the controller further functions to modify the threshold value for selecting the operating mode of the power plant according to the running state of the moving body.

19. The system as defined in Claim 18, further comprising:

a detection device which detects a displacement speed of the moving body, and

a detection device which detects a load of the moving body, wherein the controller further functions to estimate the weight of the moving body based on the displacement speed and load of the moving body.

20. The system as defined in Claim 19, wherein:

the controller further functions to modify the threshold used for selecting the operating mode of the power plant so that there are fewer occasions when the complete stop mode which causes the power plant to stop generating power completely is selected as the operating mode of the power plant, when the estimated weight of the moving body is more than a predetermined weight threshold.

21. The system as defined in Claim 19, wherein:

the controller further functions to modify the threshold used for selecting the operating mode of the power plant so that there are fewer occasions when the complete stop mode which causes the power plant to stop generating power completely is selected as the operating mode of the power plant, as the estimated weight of the moving body increases.

22. The system as defined in Claim 18, further comprising:

a detection device which detects the displacement speed of the moving body, wherein

the controller further functions to:

estimate the type of road on which the moving body is traveling based on the displacement speed of the moving body.

23. The system as defined in Claim 22, wherein:

the controller further functions to:

estimate that the moving body is traveling on an expressway when the average value of the displacement speed is high, and

when it is estimated that the moving body is traveling on the expressway, modify the threshold used for selecting the operating mode of the power plant so that there are fewer occasions when the complete stop mode which causes the power plant to stop generating power completely is selected as the operating mode of the power plant.

24. The system as defined in Claim 18, further comprising:

a detection device which detects the displacement speed of the moving body,

a detection device which detects the braking state of the moving body, and

a detection device which detects a blinker state of the moving body, wherein

the controller further functions to:

estimate the state when the moving body has stopped based on the

displacement speed, braking state and blinker state of the moving body.

25. The system as defined in Claim 24, wherein the controller further functions to:

modify the threshold used for selecting the operating mode of the power plant so that there are fewer occasions when the complete stop mode which causes the power plant to stop generating power completely is selected as the operating mode of the power plant, when the displacement speed is zero, braking is performed and a blinker is operating.

26. The system as defined in Claim 18, further comprising:

a detection device which detects the load of the moving body, wherein the controller further functions to:

estimate the power of the moving body from the load of the moving body.

27. The system as defined in Claim 26, wherein the controller further functions to:

statistically analyze the load of the moving body, and when the cumulative frequency of a predetermined region exceeds a predetermined rate, modify the threshold used for selecting the operating mode of the power plant so that there are fewer occasions when the complete stop mode which causes the power plant to stop generating power completely is selected as the operating mode of the power plant.

28. The system as defined in Claim 26, wherein the controller further

functions to:

statistically analyze the load of the moving body, and when the median value of the load exceeds a predetermined value, modify the threshold used for selecting the operating mode of the power plant so that there are fewer occasions when the complete stop mode which causes the power plant to stop generating power completely is selected as the operating mode of the power plant.

29. The system as defined in Claim 26, wherein the controller further functions to:

statistically analyze the load of the moving body, and when the most frequent value of the load exceeds a predetermined value, modify the threshold used for selecting the operating mode of the power plant so that there are fewer occasions when the complete stop mode which causes the power plant to stop generating power completely is selected as the operating mode of the power plant.

30. The system as defined in Claim 26, wherein the controller further functions to:

statistically analyze the frequency of the load, and when the average value of the load exceeds a predetermined value, modify the threshold used for selecting the operating mode of the power plant so that there are fewer occasions when the complete stop mode which causes the power plant to stop generating power completely is selected as the operating mode of the power plant.

31. The system as defined in Claim 18, further comprising:

a navigation system which receives position information about the moving body, wherein

the controller further functions to estimate the running state of the moving body from information from the navigation system.

32. The system as defined in Claim 31, wherein:

the controller further functions to predict a time when high power of the power plant will be required from information from the navigation system, and when the time until the predicted time is less than a predetermined time, modify the threshold used for selecting the operating mode of the power plant so that there are fewer occasions when the complete stop mode which causes the power plant to stop generating power completely is selected as the operating mode of the power plant.

33. The system as defined in Claim 18, wherein:

the controller comprises a rewritable memory and a non-rewritable memory which store the threshold used for selecting the operating mode of the power plant.

34. The system as defined in Claim 33, wherein:

the controller further functions to:

update the value stored in the rewritable memory when the threshold used for selecting the operating mode of the power plant is modified, and subsequently select the operating mode of the power plant using the updated value.

35. A fuel cell power plant system for a moving body, comprising:

a drive device which drives the moving body by receiving power,

a power plant having a fuel cell supplying power to the drive device
and a fuel supply device which supplies fuel required for the fuel cell to
generate power to the fuel cell,

means for, selecting one operating mode from plural operating modes
according to the running state of the power plant when the moving body
has stopped, the fuel cell not generating power to be supplied to the drive
device in the plural operating modes, and

means for controlling the power plant based on the selected operating
mode.

36. A control method for a fuel cell power plant system for a moving body,
the system including a drive device which drives the moving body by
receiving power, and a power plant having a fuel cell supplying power to
the drive device and a fuel supply device which supplies fuel required for
the fuel cell to generate power to the fuel cell, the method comprising:

when the moving body has stopped, selecting one operating mode from
plural operating modes according to the running state of the power plant,
the fuel cell not generating power to be supplied to the drive device in the
plural operating modes, and

controlling the power plant based on the selected operating mode.